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RESEARCH MEMORANDUM

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RESEARCH MEMORANDUM

NASA AND ACTIVITIES IN SPACE FOR
PEACEFUL PURPOSES

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RM-2426-NASA

July 29, 1959

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Section 102(a) of the Space Act has the narrower sense of "nonmilitary," and that the national objective to which NASA has a mandate to contribute is to make space activities as little as possible military in character, and as much as possible scientific, commercial, and generally "civilian." The main purpose of the paper is precisely to give brief analyses of several ways (numbered 1 to 11 below) in which NASA, within its mandate under the Space Act, might contribute to the national objective of peaceful space thus narrowly defined.

* * *

Many of the suggestions which follow involve international arrangements for the inspection, limitation, or regulation of military activity in outer space. But this paper is in no sense a general study of space "disarmament": it is concerned with agreed international control arrangements only so far as to indicate possible NASA contributions to their achievement, or to their soundness if achieved, on the assumption that such international arrangements may play a role in promoting "peaceful space." In section 12 below, brief attention is given to how such arrangements, if they are achieved, might affect a variety of NASA activities.

Similarly, while many of the suggestions below involve international scientific cooperation, no attempt has been made

Preface

A principal objective of the National Aeronautics and Space Act of 1958 is to make outer space operations peaceful rather than military. In the words of the Act (Section 102(a)), "The Congress hereby declares that it is the policy of the United States that activities in space should be devoted to peaceful purposes for the benefit of all mankind." The broad responsibility given by the Act to a civilian space agency and the substantial funds made available to NASA by Congress are also evidence of serious national interest in nonmilitary space activities. Policy statements by President Eisenhower and others have further supported the wording of the Act.

In the long run, activities in space will perhaps be "devoted to peaceful purposes for the benefit of all mankind" to the extent that activities on earth are so devoted. Therefore any U.S. activity which tends to lessen the danger of war, whether military, political, economic, or scientific, may contribute to "peaceful space." Even a space weapon system (such as bombardment satellites), if it contributed to the deterrence of communist aggression, could be considered "devoted to peaceful purposes" in the sense that it helps prevent war. In this paper, however, it is assumed that the term "peaceful" in

to analyze broadly the possibilities or problems in this area. The paper merely offers a survey of how related NASA activity might contribute to "peaceful space." Section 13 lists some other objectives besides "peaceful space" which may be served by scientific cooperation: these may well be more important reasons for NASA support of such cooperation.

Finally, the discussion is theoretical and exploratory. Official proposals and activity relative to space "disarmament" and international scientific cooperation are outlined briefly elsewhere.* None of the following suggestions is in any sense a recommendation for action. Moreover, the order of their presentation carries no implications regarding priority of consideration. Further study of each (and of others not discussed), in relation both to "peaceful space" and to other national space objectives, would be a minimum prerequisite for setting up priorities and taking action.

*See the author's International Control, Scientific Cooperation, and Legal Aspects of Outer Space: A Summary of Developments, Research Memorandum RM-2422-NASA, The RAND Corporation, July 23, 1959.

least become relatively manageable. There is a certain parallel between this concept and "Atoms for Peace." As originally presented, the latter program was intended to take attention and (more important) fissionable material away from military atomic programs, and by this means to bring closer the day when atomic energy would serve exclusively peaceful and humanitarian objectives all over the world.

With the passage of sufficient time and the development of various civilian space activities, especially of a commercial, industrial, or other economic character, it may happen that military space activities will be dwarfed by the nonmilitary. NASA, through its scientific research and through active efforts to discover and develop commercial uses of space, may indeed contribute to hastening such a development. Perhaps there is even some justification in seeking and promoting these commercial uses for their possible contribution to "swamping" military space activities. There are, however, grave difficulties. No commercial applications seem to be in sight which have any real chance of producing a quick flowering of civilian space activities. Costs are far too high, and alternative ways of achieving economic ends are available at far less cost.

Moreover, if larger-scale commercial activity does develop, there will arise directly new military problems: the distinction between peaceful applications of outer space and military

1. Co-ordination with Other Agencies

Obviously NASA alone cannot achieve the objective of peaceful space. If it ever does come about that there are nothing but peaceful "activities in space," this will be the result of major political developments involving other branches of the government and notably the State and Defense Departments. If NASA is to make a rational contribution to this objective, it must actively inform itself of the policies and thinking in these other branches, in the Congress, in the United Nations, and in the relevant political and military branches of other governments. In particular its staff should probably try to work closely and on a personal basis with individuals in the White House, the State Department, and the Defense Department who are directly charged with developing and implementing U.S. policy on the international regulation, control, limitation, and inspection of military activities in outer space.

2. The "Space for Peace" Approach

It is an attractive idea to attempt to see that activities in space are "devoted to peaceful purposes for the benefit of all mankind" simply by multiplying the activities in space which are so devoted, in the hope of swamping any military activities and in this way somehow making them disappear, or at

space activities, when and if it does develop, will automatically make a contribution to the objective of "peaceful space." NASA research and sponsorship of commercial space development may support this objective, but they may instead complicate or even preclude it. What seems clear is that NASA, as a prime mover in the efforts to develop peaceful applications in space, must recognize that these aspects of its activity may influence matters in either direction, and NASA must try to see, in general, that the effect is the desired one, perhaps by selecting certain directions for research and development and perhaps by doing what it can to see that any commercial developments take a form that will not unnecessarily worsen the prospects for "peaceful space."

3. Carry-overs from Scientific Co-operation

Programs of co-operation between U.S. and foreign scientists, sponsored by NASA or participated in by NASA, may provide precedents for successful joint work which could have a carry-over into inspection, control, and limitations systems for the regulation of military space activities. Therefore this is one objective (among many others) to be considered in sponsoring or participating in international scientific co-operation relative to space.

ones may be no more clear-cut and absolute than the distinction between military and peaceful applications of nuclear energy. Rockets built for "peaceful" and commercial purposes may be readily convertible for military payloads and uses. Any attempts to enforce limits upon space weapons by strict inspection may be greatly complicated by the existence of large-scale nonmilitary space activities. Furthermore, new areas -- more precisely, new "volumes" -- for conflict and international friction may be opened by peaceful space activity. For example, one can readily imagine friction arising over the exploitation of mineral resources on Mars, and even hostilities between various "colonies" on other planets.

"Space for Peace" is basically different from "Atoms for Peace" in that the former has no need for the very scarce and expensive fissionable materials (mainly U-235 and Plutonium) required for nuclear weapons production. Nuclear weapons depend on fissionable material; but space devices have no comparable dependence on scarce materials. If the world has more of its fissionable material in nuclear reactors then there will be less in nuclear weapons; but if the nations of the world have a large nonmilitary space program, this does not necessarily mean that they will have small military ones. Therefore one cannot assume that the flowering of nonmilitary

is, it would not be necessary, for example, to have a joint U.S.-Soviet exploration team on the moon to get a useful precedent for an international inspection arrangement involving the moon. The co-operative work could almost as well take place on the Earth; it could perhaps deal as usefully with (say) the theoretical range capabilities of infra-red detection systems as with an on-the-spot investigation of the depth of lunar dust. In fact, some of the possible advantages of co-operative scientific efforts would flow from work having no direct bearing on space matters at all. Friendships among scientists of different nationalities, for example, could flower quite as well outside space research and could be helpful when and if these same scientists subsequently found themselves taking part in internationally agreed arrangements for space weapons control.

On the other hand, programs of international scientific co-operation in space research, or in other areas, might not have a significant carry-over into space weapons regulation. The political sensitivity of inspection arrangements, demonstrated by the recent Geneva negotiations regarding nuclear tests, would be at least as great relative to space weapons. Consequently, arrangements for space inspection or control are perhaps likely to be very carefully drawn up, and tightly

Co-operation among scientists of different countries has of course been going on for hundreds of years. In recent years it is possible that the many personal contacts among West European and U.S. scientists in their scientific specialties have been helpful in developing national policies concerning the international control of atomic energy. The fact that Soviet scientists have at least had some contact with Western science, though rarely on a personal basis, has perhaps contributed to a mutual appreciation of technical competence and scientific integrity at the international technical discussions of arms control, restrictions on nuclear tests, and the possibilities for dealing with surprise attack. Since arms control discussions after World War II have not led to the setting up of any control systems, there is no direct evidence that the functioning of such systems would be appreciably facilitated by past co-operative efforts or scientific contacts. Possibly some evidence of a favorable effect might be induced from the experience of American and British scientists working together on mutual military problems (radar, undersea warfare, atomic bomb development, etc.) in World War II.

In order for international scientific co-operation to have a carry-over into space weapons control systems, it would not have to involve directly activities in outer space. That

On the other hand, to the extent that Western negotiators are informed on the corresponding aspects of Communist scientific and technical activities and peculiarities, they can make more foolproof any agreed provisions for inspection and control. Indeed, without more contact than we have had to date, it may be that we would not be able to make the provisions sufficiently airtight.

4. Conversion of Bases or Installations

An important variation of the foregoing is the possibility of utilizing joint space bases (on artificial satellites, the moon, Mars, etc.) or other space installations (for example, unmanned satellites, space buoys, earth-based rocket tracking installations, etc.) for international inspection or control systems. Such installations would presumably have been designed primarily for scientific or perhaps for commercial purposes. But this would not preclude their utility for the objects of an international space control system of some sort.

Any such installations that were set up on a purely national basis could be adapted for new purposes, as could those undertaken jointly by several Western powers. But to the extent that Soviet-bloc scientists and technicians were directly involved, the opportunities might be greater for the effective

interpreted in their operation. Little opportunity might be left to profit from earlier experience with joint programs undertaken in an easier atmosphere, of less direct interest to national governments, and without the drastic involvement in matters of war and peace. Even in the negotiations preceding any possible space weapons agreements the issues are likely to be regarded by all sides as too important to be settled on a purely scientific basis, and too important and unusual politically and militarily for past experience in co-operative arrangements to be of much use in determining the nature of the new arrangements.

A still gloomier possibility is that joint scientific undertakings between the West and Soviet-bloc countries might give Communist negotiators the "inside information" from which they could build loopholes and evasion possibilities into space control and inspection arrangements. The greater the Soviet familiarity with the working habits, interests, thought processes, bureaucratic routines and the like of Western scientists and technicians, the more feasible it becomes for Communist political strategists to exploit these for their own purposes. Thus even international scientific co-operation between East and West could conceivably work to the disadvantage of the objective of peaceful space.

encourage a corresponding purpose on the other side of the Iron Curtain.

Moreover, if the scientists of smaller nations or of "neutrals" are also directly involved in space programs for scientific purposes, then it may be appreciably easier to satisfy the demands frequently raised for the participation of representatives of the smaller powers, or of neutrals, in prospective international inspection arrangements. It is notable that the smaller powers have been represented to the exclusion of the major nations in the truce inspection teams in Korea and in the Middle East. Perhaps a major reason for encouraging the participation of scientists from the smaller or neutral nations in our own space projects is to ensure their technical competence and availability for possible international inspection and control operations. This is desirable also because it is sometimes pointed out that, in the unlikely event of international arrangements to control and inspect nuclear armaments and the production of fissionable material, the competent personnel available from all countries large or small would be very much less than the minimum requirement.

Of course another major source of both personnel and installations for any space control or inspection system lies in the national military programs. Here is another instance

functioning of installations in new roles to the satisfaction of both the Communist and non-Communist worlds.

The possibility of conversion of space installations to the purposes of an international space weapons agreement of some sort should perhaps be a consideration in the design of such installations, in budgeting for them, and in determining the appropriate form of international co-operation (if any) in their employment or operation.

5. Conversion of Personnel

In addition to converting specific installations to "peaceful space" uses, there is also the possibility of "converting" personnel. For example, if the U.S. and the U.S.S.R. each have scientific personnel familiar with monitoring the orbits of satellites, or familiar with tracking space vehicles penetrating to the outer reaches of the solar system, this will make easier the manning of jointly operated monitoring and tracking systems under an international control agreement.

That the U.S., the Soviet Union, and perhaps other technically advanced powers will have national scientific space programs is clear. Perhaps in our own programs we should bear in mind the possibility of "personnel conversion" when selecting and budgeting specific space activities, and possibly even

A specific instance of the above generalization is already a reality. The reconnaissance satellite is closely related to and perhaps identical with the inspection satellite that could perform useful functions under an international arms control arrangement. The developers of the reconnaissance satellite should perhaps be mindful of its possible use in an agreed inspection system.

This example also reminds us that space "hardware" may have a direct utility not only in promoting the peacefulness of outer space, but also in establishing arrangements for the control or limitation of more familiar weapons.

7. An Agreed "Data Bank"

NASA might make a signal contribution to political arrangements for peaceful uses of outer space by developing and maintaining, through international agreement, a body of scientific information on space phenomena and on the capabilities and limitations of space systems. Such data, contributed by the scientists of many nations, preferably including those of the Communist bloc, could provide the indispensable scientific basis for any space control and inspection arrangements.

In July 1946 the U.N. committee charged with developing an atomic control agreement found it necessary to begin its work

of the need for co-ordination with military activities. But since a prime requirement for any such system is that it take into account the most advanced scientific and technical evasion possibilities, it would seem that personnel engaged in scientific programs such as NASA's might have a clear advantage over those with primary competence in military operations.

6. Development of Hardware

NASA could contribute to the technical feasibility of international space weapons control and inspection systems by actively searching for and developing useful control and inspection "hardware."

The U.S. will have strong military requirements for many or most of these same devices or systems, since there is a considerable overlap between the devices needed for detection, surveillance, interception and the like for military purposes in the absence of international agreement, and those needed for international control and inspection. But it would be unwise to assume that the military systems will automatically meet inspection requirements. To take another illustration from the nuclear inspection problem, there is no military requirement for the detection of small underground nuclear explosions, but there would be an essential need to detect them in the event of a nuclear test suspension agreement.

8. Influencing Soviet Policies through Soviet Scientists

Co-operative programs between the scientists of East and West on space research may provide an opportunity for influencing the ideological outlook of Communist scientists. This in turn might conceivably lead to a favorable influence being exerted by (for example) Soviet scientists on the Soviet government in the direction of international agreements to make outer space more peaceful, and in the direction of more conciliatory and less aggressive Soviet policies in general. That is, there may be some chance of using the highly respected position which Soviet scientists hold in their society to influence Soviet national policies in directions favorable to the U.S. and to world peace, if only the Soviet scientists can themselves be so influenced.

Several serious problems, however, are involved here. We know that Soviet scientists hold a privileged position in Soviet society, in terms of both status and income. This may tend to give them a vested interest in the maintenance of the present regime and social system. Therefore the impressions Soviet-bloc scientists may get from closer contact with their Western counterparts is just so much the less likely to influence their beliefs in favor of the West or to move them to attempt a more constructive influence on Soviet national policies.

by a study of the technical aspects of atomic energy. During several years of subsequent negotiations the unanimous agreement obtained on the resulting technical report was the only important instance of unanimity. Much more recently, the idea of preliminary "technical" conferences on weapons control matters has been revived, and such conferences have been held at Geneva on the nuclear test ban and on surprise attack.

In the event of serious negotiations over space weapons control, these precedents make it clear that the time required for technical discussions will be much shortened if there already exists a substantial amount of data to which scientists on both sides of the table (and preferably in neutral countries as well) have agreed and themselves contributed. More important, any subsequent agreements on the political level are more likely to be scientifically sound if the data on which they are based have been exposed to the full international scientific community and are therefore as valid as the current level of scientific understanding will permit.

The major powers, at least, will consider that military security requires the withholding of important segments of research data on space phenomena and capabilities. But it must be recognized that one of the considerations arguing for fuller release of data is their possible contribution to the attainment of sound control and limitation agreements.

to gather the evidence already available on the political views of Soviet scientists expressed privately to Western colleagues. On the basis of such studies it might be possible to devise some rational policies and actions intended to influence the Soviet Union toward fuller co-operation in space matters and more generally through contact and co-operation with Soviet-bloc scientists in various NASA undertakings.

In the absence of such analyses, however, it seems unwise to assume that East-West co-operation in space matters at the "working scientist" level will necessarily have an important effect on Soviet national policies, or that whatever effect there may be will be favorable.

9. Reducing Soviet Exploitation of Space Secrecy

East-West co-operation in scientific space programs might well compromise the heavy curtain of secrecy which currently surrounds Soviet military space devices and activities.

This very fact is no doubt a reason for hesitation on the part of Soviet military and political leaders (and probably also on the part of some Soviet scientists) in agreeing to even the relatively mild forms of co-operation that have thus far been officially suggested. (Although the official Soviet position favors international co-operation in space exploration,

Also, while scientists as scientists are peculiarly aware of the value of objectivity and the dangers of ideological preconceptions, a scientist in the Soviet Union is necessarily accustomed to accept as final the higher authority of the national government. Moreover, while the dictators of the Soviet Union (and China) do depend to an important degree on the work of their scientists for national prestige, military power, and perhaps even their personal power, they certainly do not share their rule in any important sense with the scientists. Soviet nuclear scientists may have had a role in determining their country's positions in the technical talks at Geneva on nuclear test inspection -- talks which led to agreement -- but they have certainly exerted no corresponding influence on negotiations to set up an inspection system, which could have serious political implications for the Soviet dictators -- negotiations which have not led to agreement.

It would be possible to make a useful study of the participation by the Soviet scientists in IGY undertakings, in the nuclear test and surprise attack negotiations, in COSPAR, in the Pugwash conferences, etc. Also, a close analysis could perhaps be made of the role of individual Soviet scientists in Soviet policy matters inside the Soviet Union, the role of the Soviet Academy of Science, and the like. It would be useful

from the clear demonstration of Soviet scientific and technical achievement that such co-operation could well involve. These gains might come to overshadow the advantages to be derived from proclaiming a vast military capability without revealing its precise nature.

10. Aiding in Nuclear Test Detection

The problem of detecting nuclear explosions in outer space has recently arisen in the Geneva negotiations on the suspension of nuclear testing. NASA might contribute directly to any inspection systems for this purpose and even to feasibility studies useful in the design and negotiation of an effective inspection system. This would be a direct contribution to the national interest and could also be of help to NASA in gaining experience in arms control and inspection negotiations, and in the operation of a practical system. It might also contribute to the development of appropriate contacts with the various other agencies interested in arms limitation problems.

11. Contributing to Operating International Control Arrangements

If an agreed international arrangement for the regulation of military activities in outer space does materialize -- and up to this point we have been discussing what NASA might do to

the Soviet Union is currently boycotting the U.N. committee charged with promoting such co-operation and has recently indicated a refusal to participate in COSPAR activities.) But since there are also clear benefits to Soviet prestige in international space co-operation, especially in view of the advanced Soviet position in space rocketry, it is assumed here that some degree of practical co-operation may be possible.

Any information that does materialize from East-West co-operation will of course be of prime interest to our own military planning. Here is a major reason for seeking such co-operation. But the point for us here, relating to "peaceful space," is that a declining ability to keep their military space program shrouded in its present dramatic secrecy may tend to make this program less attractive for the Kremlin rulers as a major instrument of national policy.

A substantial fraction of the political gains reaped by the USSR from their Sputniks and space probes has come from the element of surprise, combined with an ability to imply great military capability without having to reveal the real nature of their space weaponry. Increasing involvement in co-operative space programs on a scientific level might encourage the Soviet rulers to look for political and propaganda gains from the very peaceableness of these undertakings, as well as

12. Effects of Such Arrangements on NASA Activities

The operation of any international space regulation system would probably bring new kinds of NASA involvement in military space operations, and new problems for NASA in its relations with the military agencies of the government. For example, there would be a new degree of interest from the national security point of view in the validity and currency of the information in the "data bank," and perhaps some important differences in interpretation of these data. A parallel may be found, for example, in the position of the National Academy of Sciences relative to nuclear fallout: the Academy's studies of this matter at the present time are of considerable general interest, but perhaps not of crucial immediate relevance to the national security; but if international agreement were reached on limiting fallout from nuclear tests, the studies of the Academy might then reveal the possibility of Soviet violations, and therefore become of immediate importance at the policy level.

Moreover, the activities of NASA might themselves be subject to international inspection, to see if any evasions were involved: certainly the U.S. would have an interest in inspecting Soviet "scientific" activities in space under a reciprocal space weapons control agreement.

bring this about, rather than what it might contribute if it is achieved -- then there would be quite a variety of helpful activities which NASA could undertake.

It could provide the facilities, trained personnel, and hardware devices that might be useful for the operation of the inspection systems, to the extent that these had been prepared beforehand (see above). If NASA arrangements for international scientific cooperation developed a formal organization, this might become a ready-made institution of high scientific competence for international control arrangements. The "data bank," besides contributing to the establishment of a technically sound system, could perhaps serve the even more important function of keeping the system technically up to date: probably there would have to be continuing or periodic political-technical negotiations connected with the operation of any advanced weapon control system to prevent its obsolescence and easy evasion, and the "data bank" could provide key support for such negotiations. Under these new conditions of agreed regulation of at least some military activities in space, the information on Soviet space activities that might be gleaned from co-operative scientific undertakings would include not only military data but also indications of attempted evasion of agreed limitations.

(b) Scientific co-operation can reduce duplication of research effort, and thereby reduce costs, increase the rate of research progress, or both.

(c) Participation by scientists of countries without a space capability can put to use scientific talent that might otherwise be wasted.

(d) Co-operative space programs involving international scientific and commercial interests can alone achieve for the West a maximum space effort in competition with the Communist bloc.

(e) Scientific and commercial space co-operation between East and West can perhaps provide intelligence on Soviet military space activities.

(f) Co-operation may help avoid serious commercial and economic rivalry in space.

(g) The U.S. can gain important propaganda advantages by taking the lead in supporting international co-operation in space.

(h) The investigation of accidents connected with space operations may be facilitated by the existence of co-operative attitudes, precedents, and installations. Not only may it become more feasible to determine the cause of an accident, and perhaps on occasion to undertake rescue operations, but there

There might even be definite limitations on NASA activities (for example on the frequency and location of rocket launchings) to increase the difficulty of evading arrangements for the regulation of military space activities.

13. Purposes of Co-operation Other than "Peaceful Space"

As we have seen, international co-operation in nonmilitary space activities bears in many important ways on the declared policy objectives of the United States "that activities in space should be devoted to peaceful purposes for the benefit of all mankind." In determining the extent and nature of its support for international co-operative undertakings, however, NASA must recognize that there are other major purposes -- and problems -- in such co-operative efforts besides "peaceful space." It may help to put the whole picture of NASA interest in this area into a better perspective if we mention briefly some of these other purposes:

(a) International co-operation may be essential for the success of certain scientific undertakings. For example, if the moon is to be kept free from biological contamination, this will require the agreement of all countries with a lunar capability.

may also be a reduction in the danger of accidents leading to war.

(i) Scientific co-operation with the Soviet Union may reduce the likelihood of Soviet "breakthroughs in space technology" with dangerous military consequences.

(j) Co-operative scientific or commercial undertakings with our allies, or with neutrals, may satisfy rational or irrational demands for the participation of the smaller countries in space activities.